THE SUBSPECIES OF *SOLANUM GOURLAYI* HAWKES

Andrea M. Clausen
Facultad de Ciencias Agrarias, Universidad Nacional
de Mar del Plata, 7620 - Balcarce, Argentina

Katsuo A. Okada
Departamento de Agronomía, Estación Experimental
Agropecuaria, INTA, 7620 - Balcarce, Argentina

Solanum gourlayi Hawkes, a wild tuber bearing species, is commonly found in dry valleys at about 3000 m above sea level in the provinces of Jujuy and Salta in northwestern Argentina. This species includes both diploid and tetraploid cytotypes which have been found to differ only in minor morphological characters (Clausen *et al.*, 1987).

According to the morphological and geographical evidences, these cytotypes may be recognized as subspecies. The purpose of this paper is to describe the diploid and tetraploid cytotypes of *S. gourlayi* and propose their taxonomic recognition under the subspecies rank.

Solanum gourlayi Hawkes (Bull. Imp. Bur. Pl. Breed. Genet., Cambridge, 120-212, 1944).

Herbaceous; tubers ovoid to globular, 2-3 cm. diam., skin and flesh white. Stem generally erect, slender, 2-3 cm diam., branched, sparsely pubescent. Leaf green to slightly glaucous, 3.0-8.5 cm broad x 7.0-15.0 cm long. Leaf (2-) 3-4 (-5) jugate with (0-) 2-6 (-10) pairs of interjected leaflets, which are small and orbicular; lateral leaflets elliptic to lanceolate, hairs denser on lower surface, petiolulate or sessile. First pair of uppermost primary lateral leaflets 7-27 mm broad and 17-42 mm long, often decurrent (1-3 mm long) on to the leaf rachis; second pair of primary lateral leaflets 6-20 mm broad x 10-40 mm long. Terminal leaflet ovate, apex acute 7-21 mm broad x 13-55 mm long, larger than or equal to the lateral leaflets. Inflorescence 6-15 flowered, peduncle normally forked, pubescent; pedicels pubescent articulated at the middle or at two thirds from the base. Calyx green or slightly purpled tinged, pubescent, 4-8 mm long with 1-10 mm long acumens. Corolla purple or purple-violet, pentagonal, long and short radii 9-21 mm and 6-14 mm long respectively. Anther column cylindric, anthers (3-) 4 - 5 - 6 mm long. Style 8-14 mm long, 2-9 mm exserted above the anther tube; stigma clavate. Berries globular, 1-2 cm diam., green with white dots. Diploid pollen 18-22 μ diam.; tetraploid pollen 22-25 μ. Chromosome numbers 2n = 2x = 24 and 2n = 4x = 48.

Solanum gourlayi ssp. *gourlayi*

Leaf (2-) 3 (-4 -5) jugate; lateral leaflets generally smaller than the terminal leaflet, often decreasing rapidly in size towards the leaf base; petiolules 0-3 mm long. Calyx acumen 6-10 mm long. Anthers (4-) 5 - 6 mm long., style exserted 3-9 mm above the

anther tube. Diploid pollen 18-22 μ diam., 22-25 μ the diam. of tetraploid pollen. Chromosome number 2n = 4x = 48 rarely 2n = 2x = 24 (Fig. 1).

The most variable characters were analized utilizing Student's T - test (Table 1). When the tetraploids are compared with the sympatric diploids, it can be observed that they differ significantly only in a few characters such as size of the first pair of primary lateral leaflets, style length and pollen diameter. Due to the low frequency of the diploids in Jujuy (only four collections have been found so far), they have been included in subspecies *gourlayi*.

S. gourlayi ssp. *gourlayi* is restricted only to the Quebrada de Humahuaca and its side valleys in the province of Jujuy, having a south-north extension of about 100 km. It is found between 1900 and 3800 m above sea level on dry and stony hillsides and at the edge of cultivated fields.

Specimens examined
Province of Jujuy, dept. Tumbaya

Diploids

Abra de Tumbaya Grande, alt. 1900 m, Hof 1800; 9 km from Purmamarca on route 16, alt. 2800 m, Oka 4307; Quebrada de Sepulturas, Puerta de Potreros, Oka 4333.

Tetraploids

Quebrada de Sepulturas, alt. 3100 m, Oka 4336; Quebrada de Sepulturas, Puerta de Potreros, Oka 4330; Oka 4335.

Province of Jujuy, dept. Tilcara

Diploid

Quebrada de Hornillos, alt. 3050 m, Hoff 1636.

Tetraploids

Sierra de Malpaso, Quebrada de Huichaira, near Tilcara 6 km from route 9, alt. 2800 m, Oka 3801; Oka 3802; Oka 3804; Oka 3808; Oka 3810; Oka 3811; Oka 3812; Oka 3813; Oka 3814. On the road to Alfarcito, near Garganta del Diablo, alt 3000 m, Oka 4287; Quebrada del Chorro, on the way to Casa Colorada, Oka 4432; Oka 4434; on the way from Quebrada del Chorro to Molulo, Oka 4445.

probably tetraploid

Above Tilcara, Quebrada de San Gregorio, Balls, Gourlay & Hawkes 5979 (K, JGH Type collection).

Province of Jujuy, dept. Humahuaca

Tetraploids

Cianzo, alt. 3800 m, Oka 4493; Oka 4494; Oka 4495; Esquina blanca, ruta nac. 9, 100 m from Río Grande, alt. 3500 m, Oka 4549; Oka 4553; Serranía de Aparzo, Angosto de Aparzo, 39 km east of Humahuaca, alt. 3600 m, Oka 5376; Pucará, alt. 3500 m, Oka 6725; between Estación Azul Pampa and Esquina blanca, alt. 3600 m, Oka 7040; Oka 7043; Oka 7050; Oka 7051; Quebrada de Incacuevas o Chulín, alt. 3600 m, Oka 7085; Oka 7086; Esquina blanca, alt. 3600 m, Oka 7135.

Solanum gourlayi subspecies *saltense* Clausen & Okada *ssp. nova.*

Folium (3-) 4 (-5) *juga; foliola lateralia foliolum terminale plerumque aequantia petiolulis* 2 - 5 mm *longis saepe sine in rhachim decurrentibus. Acumina calycis* 1 - 3 mm *longa. Antherae* (3-) 4 (-5) mm *longae. Stylus tubum antheram* 2-5 mm *superans. Pollen* 18 - 21 μ *diametro. Chromosomatum numerus:* 2n = 24. *Differt haec subspecies a subspecie typica foliolis lateralibus basim folii non celeriter decrescentibus.*

TYPE: Argentina, Prov. of. Salta, Department La Poma, on route 40, 1 km south of El Rodeo, near the road. Alt. 3900 m, 21 March 1973. Okada, Ross, Haisma & Lucarini 4841 (HOLOTYPE, Herb. Bal.).

Province of Salta, dept. La Poma

El Rodeo, on route 40. Alt. 3900 m, Oka 4837; El Rodeo, 500 m south on route 40, alt. 3900 m, Oka 4840; El Rodeo, on route 40, km 1315, 18 km south of Abra de Acay, alt. 3880 m, Okada & Lucarini 4866; El Rodeo, 1 km south on route 40, alt. 3740 m, Okada & Lucarini 4867; on route 40, between La Quesera and El Rodeo, alt. 3700 m, Okada & Lucarini 4869; La Quesera, on route 40, alt. 3700 m, Okada & Lucarini 4870; between El Trigal and Esquina Azul, 20 km north from La Poma, alt. 3300 m, Okada & Lucarini 4919; Okada & Lucarini 4920; Okada & Lucarini 4921; near Puerta de Tomayos o Finca Azul, alt. 3480 m, Okada & Lucarini 4922; Oka 4925.

Province of Salta, dept. Los Andes

San Antonio de los Cobres, on route 51, alt 3800 m, Okada & Lucarini 4872; Okada & Lucarini 4873; Okada & Lucarini 4876; Okada & Lucarini 4877; Oka 4891; Oka 4887; Oka 4892; Oka 5570; Oka 5571; Matancillas, alt. 3700 m, Oka 5572; Sierra del Cobre, on route 51, km 1645, alt. 3800 m, Oka 5586.

Leaf (3-) 4 (-5) jugate, lateral leaflets generally similar in size to the terminal leaflet; petiolules 2-5 mm long; decurrency generally absent. Calyx acumen 1-3 mm long. Anther (3-) 4 (-5) mm long. Style exserted 2-5 mm above the anther tube. Pollen grain 18-21 μ diam. Chromosome number $2n = 2x = 24$ (Fig. 2).

In ssp. *saltense* the primary lateral leaflets do not decrease in size rapidly towards the leaf base as shown by the length of the first and second uppermost pairs (Table 1).

Subspecies *saltense* can be also distinguished from ssp. *gourlayi* by its smaller terminal leaflet, by the shorter style and anthers, by the shorter exsertion and by the smaller pollen grains. Subspecies *saltense* occurs in western Salta at altitudes of 3300-3900 m, from Sierra del Cobre southwards through the upper course of the Río Calchaquí and further south into mountain ranges of La Poma, Cachi and Isonza, with a north-south extension of about 150 km. It grows on rocky hillsides, on stream banks and about cultivated fields.

LITERATURE CITED

Clausen, A., M., K.A. Okada and J.V. Crisci. 1987. Multivariate analysis of morphological variation in diploid and tetraploid populations of *Solanum gourlayi* Hawkes and related species. Submitted for publication.

TABLE 1 - Comparative morphology of ssp. *saltense* (2x) and ssp. *gourlayi* (2x, 4x)

Subspecies	Characters *							
	1	2	3	4	5	6	7	8
saltense (2x) N = 56	31.9_a	12.9_a	26.9_a	9.9_a	4.4_a	9.62_a	3.6_a	20.4_a
gourlayi (2x) N = 19	36.6_b	15.4_b	27.8_{ab}	8.7_b	4.5_{ab}	10.1_a	4.6_b	19.6_b
gourlayi (4x) N = 138	40.3_c	17.7_c	24.7_b	9.5_{ab}	4.6_b	11.2_b	5.2_c	23.3_c

*Key to characters: 1-2 = length and width of terminal leaflet (mm); 3 = length of second uppermost lateral leaflet (mm); 4 = short radii of the corolla (mm); 5 = anther lenght (mm); 6 = style lenght (mm); 7 = style exsertion (mm); 8 = pollen diameter (μ).

Column means followed by the same letter are not significantly different ($P \leqslant 0.05$) according to the Student's T test.

N = number of plants grown in a screenhouse.

Fig. 1. *Solanum gourlayi* subspecies *gourlayi* collected at 3900 m near Tilcara, prov. Jujuy. 2n = 4x = 48. Oka 4434.

Fig. 2. *Solanum gourlayi* subspecies *saltense* Clausen & Okada, collected at 3900 m near El Rodeo, prov. Salta. 2n = 2x = 24. Holotype; Okada, Ross, Haisma & Lucarini 4841.